SYNTHESIS AND CHARACTERIZATION OF SILICA COLLOIDAL PARTICLES FUNCTIONALIZED WITH MOLECULAR SWITCHES FOR SELF-ASSEMBLY

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In the recent years, there has been an increased interest in the study of materials sensitive to different stimuli, such as the temperature, electric field, the quality of solvents and light, among others, depending on the desired property for diverse applications. One of the stimuli of our interest is the UV light presented by the azobenzene group. This group changes its conformation from trans to cis on irradiation with UV light. This process is reversible applying white light. When the azobenzene changes its conformation, the dipole moment of the azo-group also changes, producing a certain effect on the system. In the case of colloidal systems, this might result in colloidal self-assembly because of change of inter-particle interactions due to differences in the dipole moment of the azo-groups attached to the particles surface, generating particle aggregation.

In this work we present the results of the presence of azobenzene group attached to particle surface on particle aggregation behavior. To achieve this goal, we designed and synthetized two azo-compounds with different properties. The first one has a –OCF₃ group in order to increase the dipole moment on UV light illumination and maximize the phenomena of self-assembly. The second one is a symmetric compound with the capacity for cross-coupling the particles depending on the UV light irradiation time. These compounds are used to decorate silica particles previously functionalized with (3-Aminopropyl)triethoxysilane (APTES). We characterized the particle self-assembly and cross-coupling in response to the UV light by diverse techniques, such as dynamic light scattering, optical microscopy, scanning electron microscopy, UV-Vis spectroscopy and zeta-potential.

Keywords: Silica-Particles, UV-light, Self-assembly

References:

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